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RESEARCH DEPARTMENT

NEW U.H.F. TRANSMITTING AERIAL FOR THE CRYSTAL PALACE TELEVISION STATION

Technological Report No. RA-15/9
UDC 621.396.712. 1968/55

It uses SI units in accordance with B.S. document PD 5686.

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for Head of Research and Development

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INTRODUCTION

The u.h.f. transmitting aerial at Crystal Palace has been replaced by a new aerial having better h.r.p. uniformity and v.r.p. null-filling. The old aerial was of the skew type mounted on the 1·32 m (4 ft 4 in.) square section of the tower. The new aerial is a panel type built as a top mast on the tower. The aerial changeover started after close-down on 15.8.68 and was completed before the start of normal transmissions on 18.8.68.

The station serves the Greater London area and parts of south-east England.

SUMMARY OF INSTALLATION

Site: The site is at Crystal Palace, 9·6 km (6 miles) south of central London, grid reference TQ 339712, site height 110·3 m (362 ft) a.o.d.

Support Structure: The aerial is supported by a square-section steel lattice tower having a base dimension of 36·6 m (120 ft). The tower is oriented with the normal to one face on a bearing of 22° ETN.

General Arrangement: See Figs. 1 and 2.

Channels: The aerial is designed to radiate on the following channels:

Channel	26	33
Offset (line frequency)	−5/3	0
Programme	BBC-1	BBC-2

A separate aerial of identical design will be provided for the ITA (Channel 23) and Programme 4 (Channel 30).

Aerial: The aerial comprises four tiers, each of three 4λ panels, giving a total radiating length of 14·0λ at Channel 26 and 15·6λ at Channel 33. Each panel is provided with two feed points. The panels are mounted centrally on the faces of a 991 mm (3 ft 3 in.) triangular spine and are protected by a glass-fibre weather shield having a diameter of 1·52 m (5 ft). The panels in each tier are fed with nominally equal-amplitude co-phased currents. Figs. 3 and 4 show the arrangement of the panels inside the glass-fibre cylinder and Fig. 5 shows the construction of each panel.

The mean height of the aerial is 211·4 m (693 ft 6 in.) a.g.l.

Feeders: The arrangement of the distribution feeders is shown in Fig. 6. Each half of the aerial is connected to the transmitters by a feeder type S. & H. 64/156C (Ls).

Power: Two 25kW vision transmitters and two 5kW sound transmitters are in use on Channel 33 (BBC-2). At a later date (1969) these will be replaced by two 40kW vision transmitters and the associated 8 kW sound transmitters. When these are operated at full power, the maximum effective radiated power (e.r.p.) will be slightly less than the 1MW permitted under the Stockholm Agreement.

Each vision transmitter is combined with a sound transmitter and the combined outputs are paralleled by means of a diplexer. The output of the diplexer is divided equally to the two main feeders. This arrangement eliminates effects arising from differences between the modulation characteristics of the vision transmitters.

At a later date (1969) two 40kW vision transmitters and the associated 8kW sound transmitters will be installed for operation on Channel 26 (BBC-1) together with the two-channel combining units. The present arrangement of transmitters and switches is shown in Fig. 7.

Templet and horizontal radiation pattern (h.r.p.):

The h.r.p. was required to be omni-directional with a maximum e.r.p. not exceeding 1MW. The specified tolerance on the h.r.p. uniformity was $\pm 2{\cdot}5$ dB. The h.r.p.s at the vision carrier frequencies of Channels 26 and 33 are shown in Figs. 8 and 9.

Vertical radiation pattern (v.r.p.):

The v.r.p. was specified to be null-filled up to an angle of declination of $25°$ and with the maximum of radiation tilted $0{\cdot}6° \pm 0{\cdot}1°$ below the horizontal. This is achieved by means of a phase distribution over the length of the aerial.

The v.r.p.s obtained for each face, shown in Figs. 10 to 12, were computed from measurements of the amplitudes and phases of the feeds to the aerial panels, taken after erection.

Gain:

Channel	26		33	
	dB		dB	
Mean intrinsic gain		12·3		12·7
Deduct aerial losses:				
V.R.P. null-filling	1·2		1·5	
Distribution feeder & transformers	0·5	1·7	0·5	2·0
Mean net gain		10·6		10·7
Deduct other losses:				
Main feeder	1·6		1·6	
Ground run & diplexer	0·1		0·1	
Combining unit	0·4	2·1	0·4	2·1
Mean effective gain		8·5		8·6
H.R.P. maximum/mean ratio		1·8		1·5
Maximum effective gain		10·3		10·1

Programme Feed: G.P.O. cable.

ACKNOWLEDGEMENTS

The mechanical and electrical design, construction and setting-to-work of the aerial were carried out by E.M.I. Electronics Ltd. The contracting authority was the BBC Transmitter Planning and Installation Department.

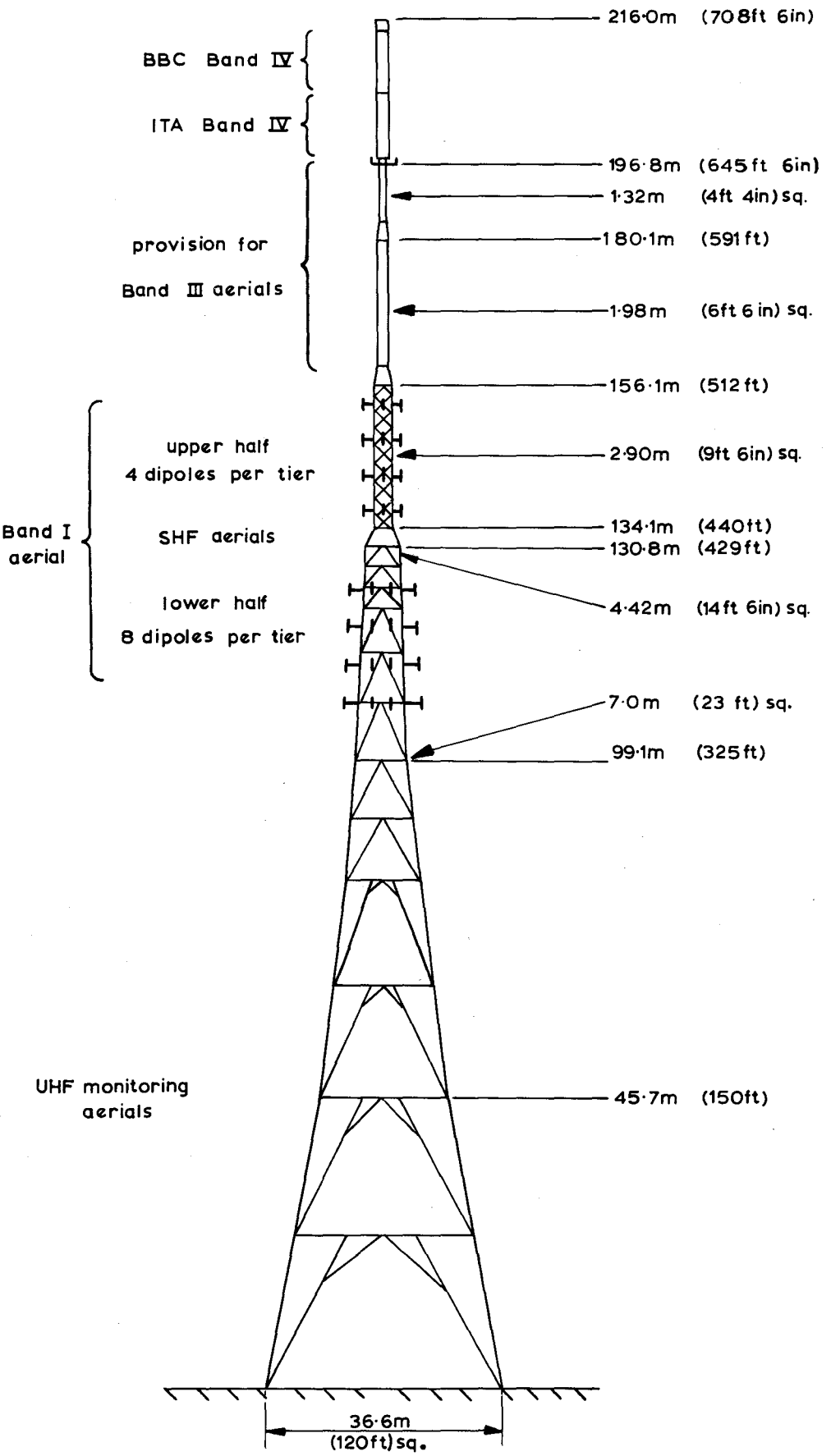

Fig. 1. General arrangement of aerials on tower.

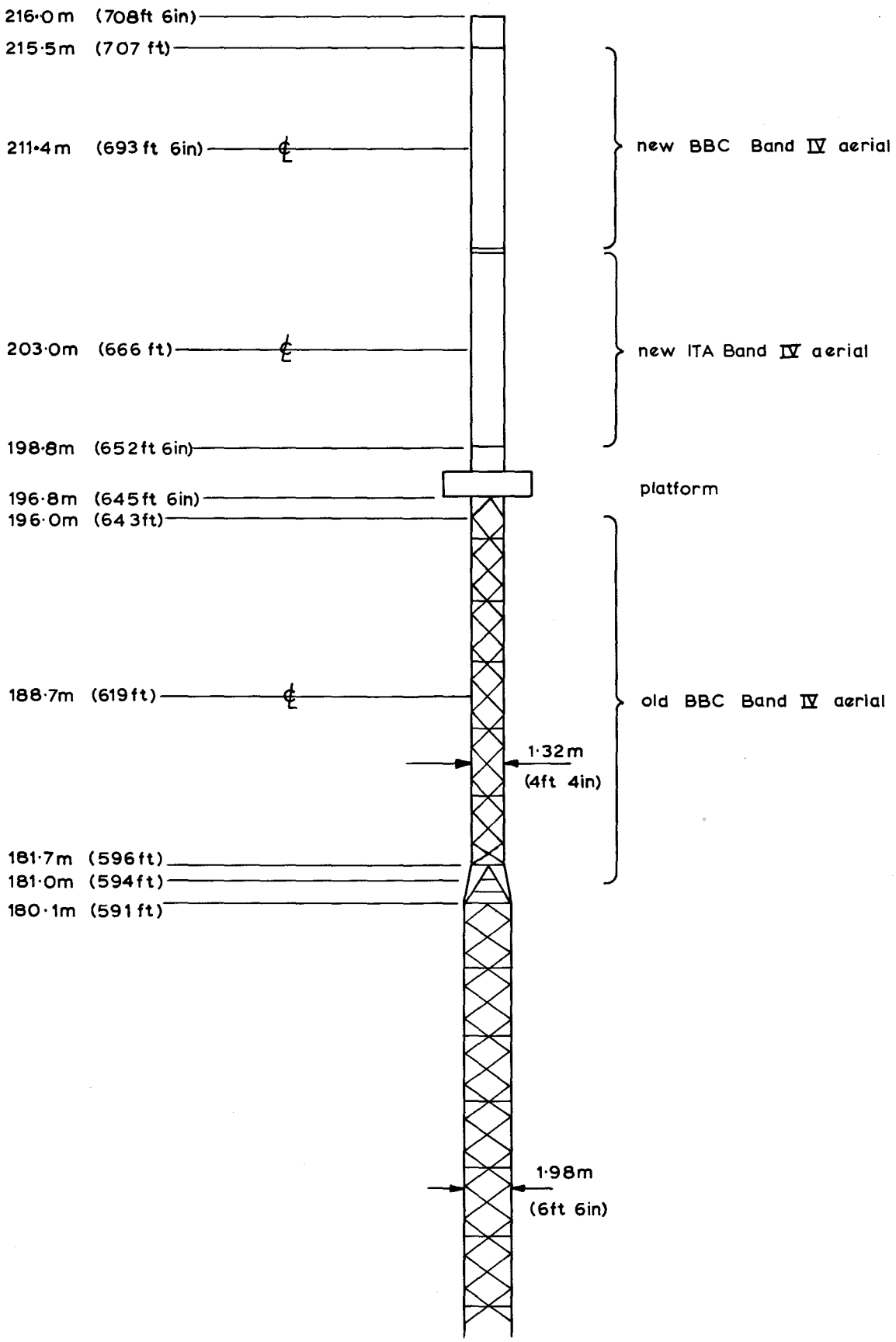

Fig. 2. Relative positions of old and new UHF aerials.

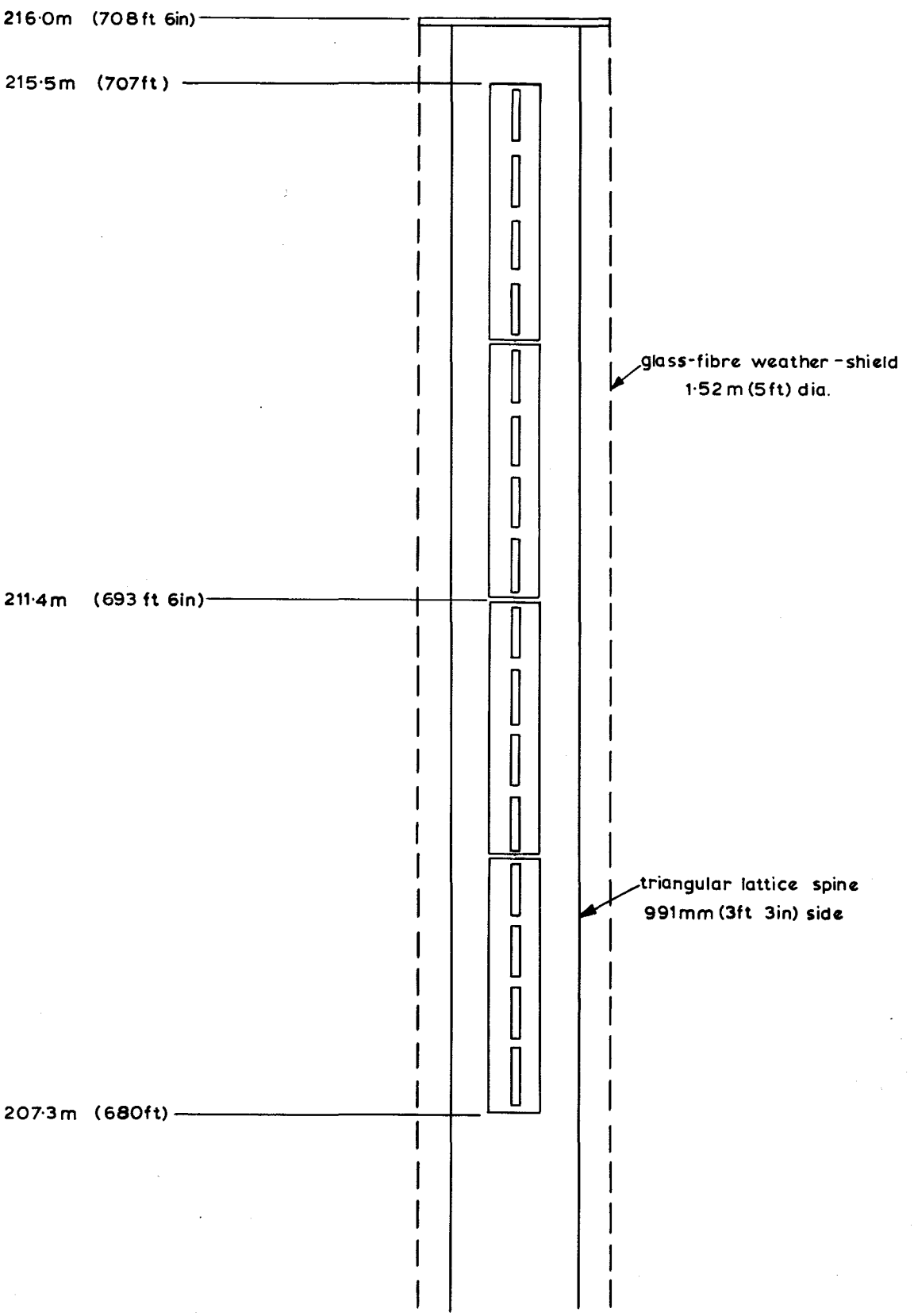

Fig. 3. Elevation of aerial.

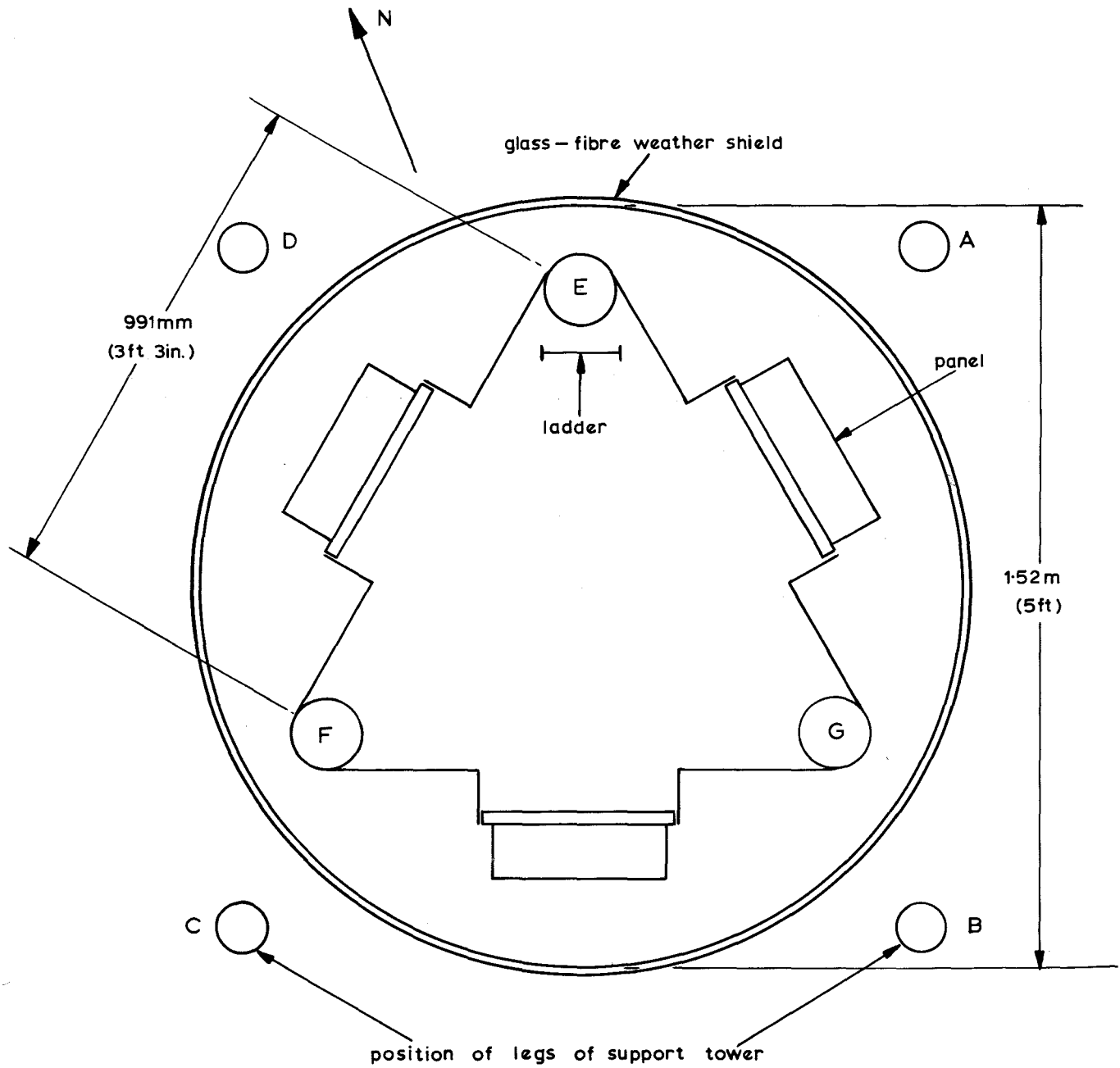

Fig. 4. Plan of aerial

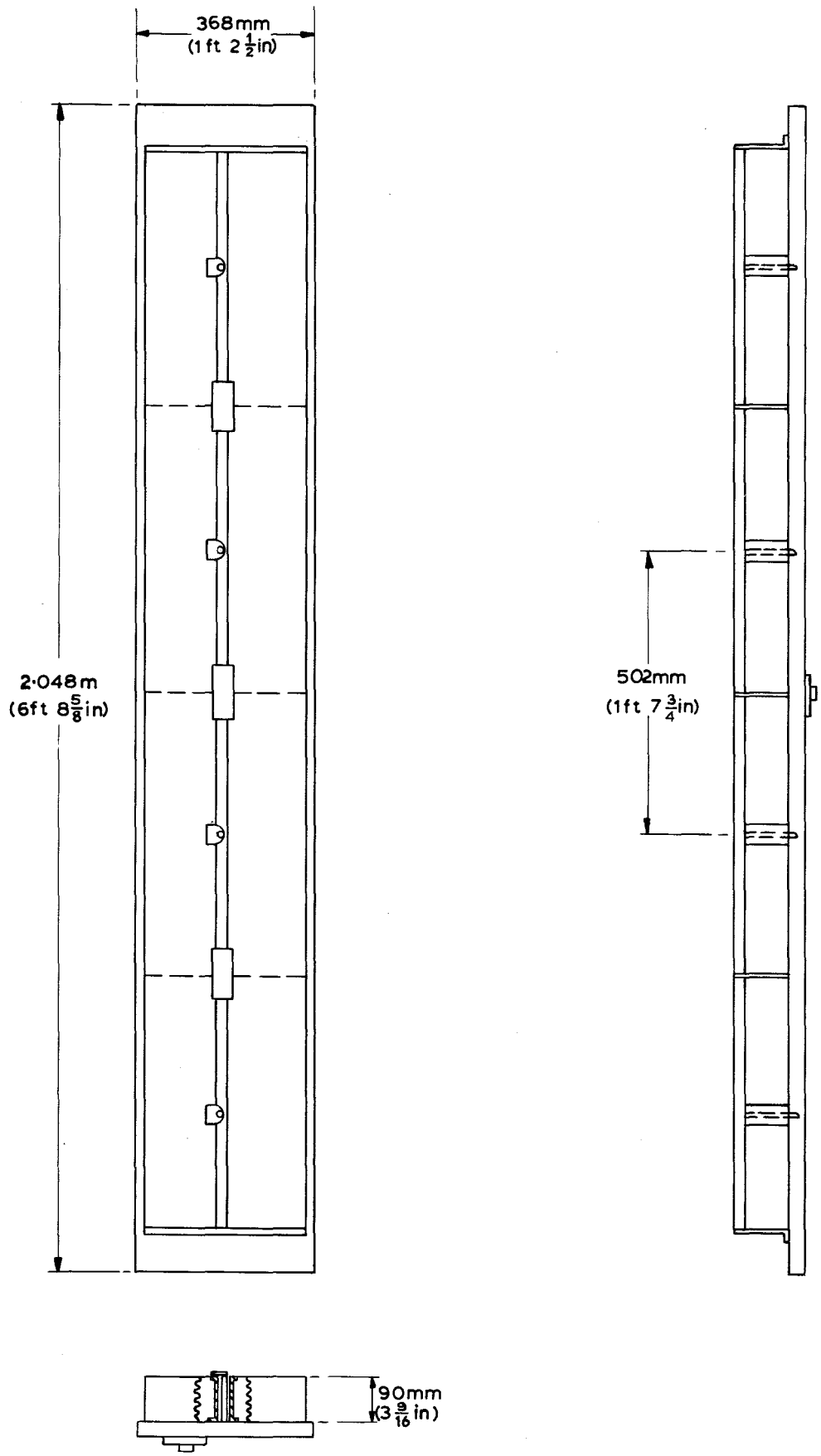

Fig.5. Construction of aerial panel

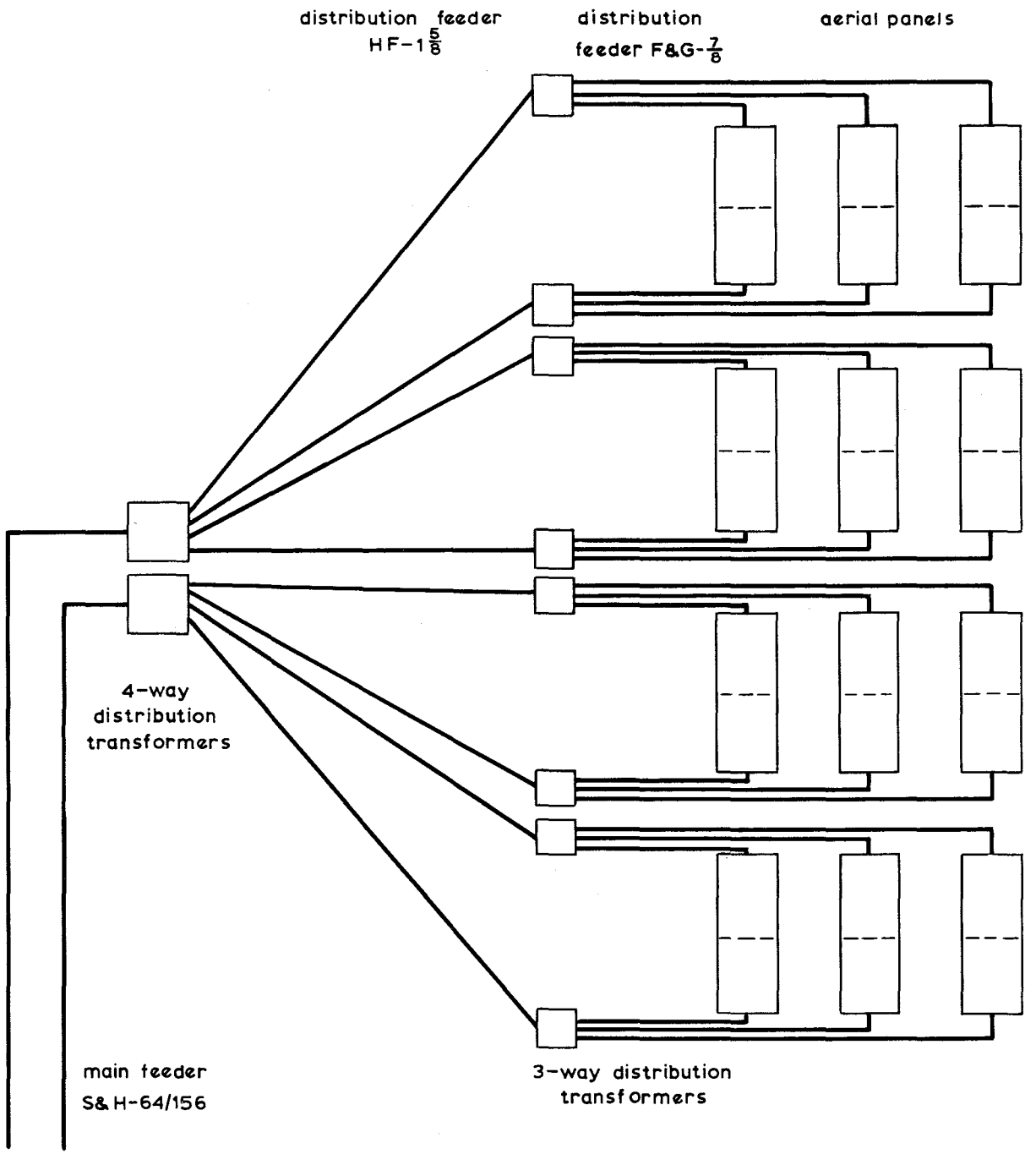

Fig.6. Arrangement of distribution feeder

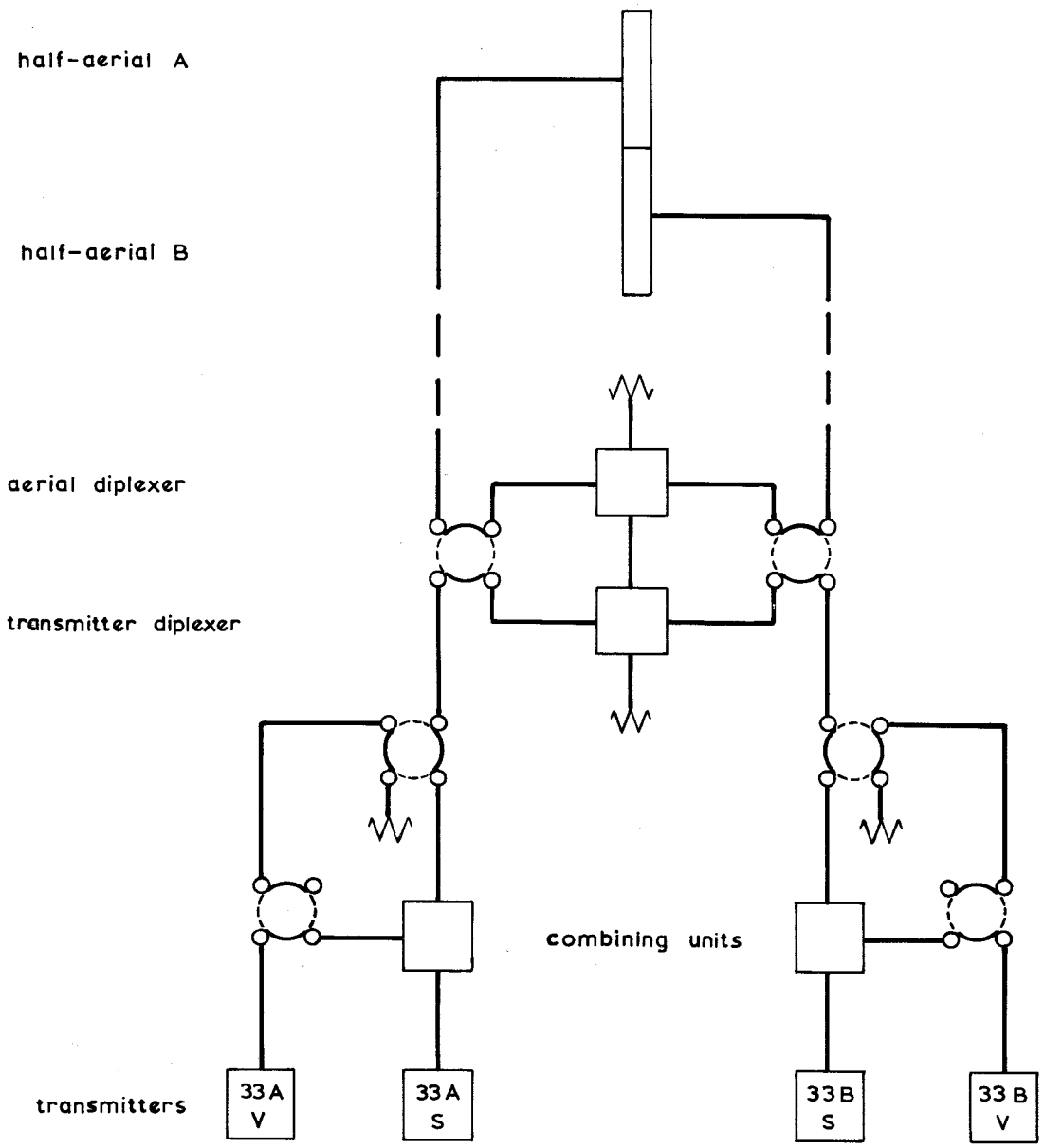

Fig. 7. 25 kW switching system.

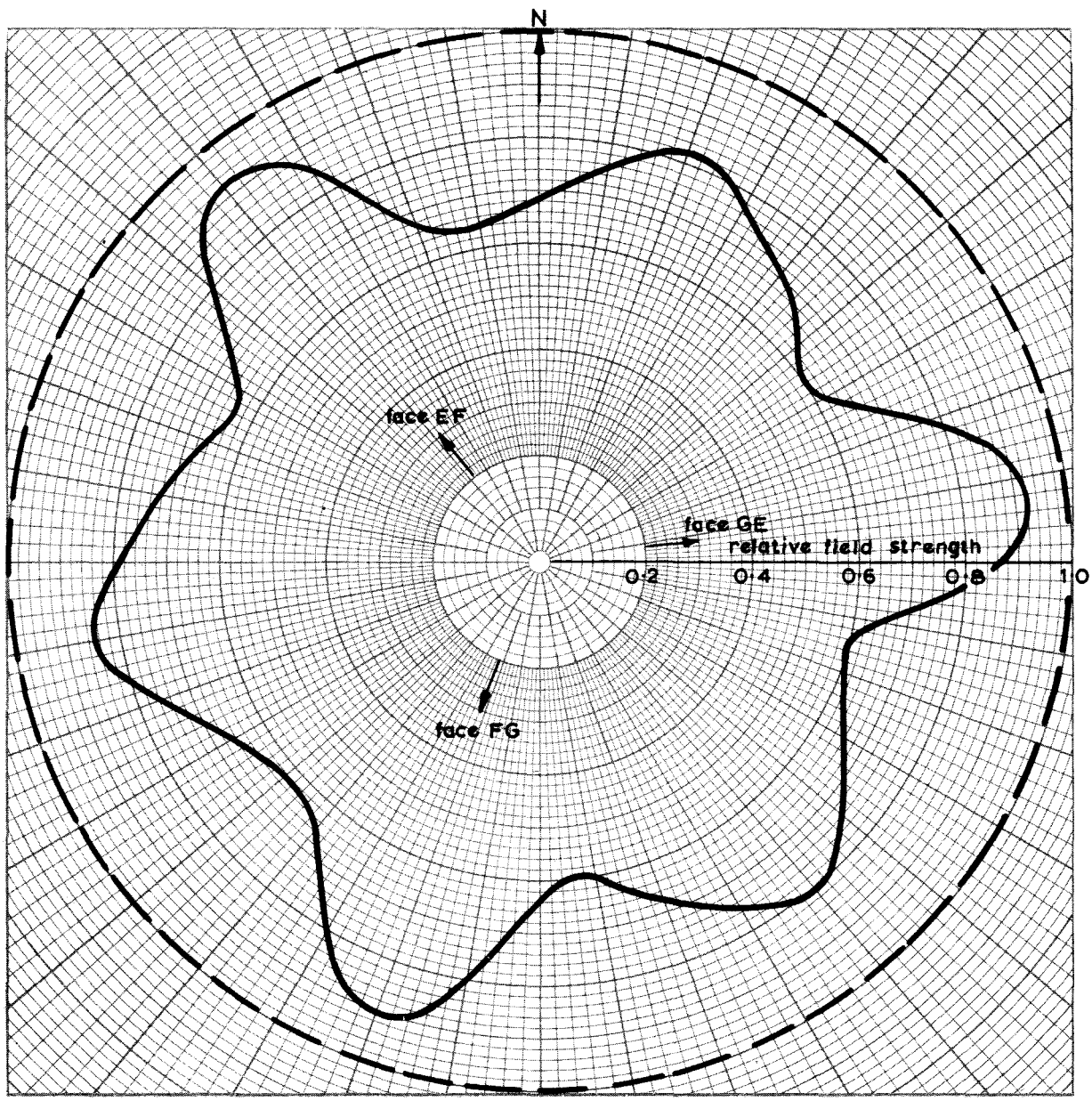

Fig. 8. Horizontal radiation pattern: Channel 26 (BBC 1)

HORIZONTAL POLARIZATION

Vision carrier 511·25 MHz, Sound carrier 517·25 MHz.

Mean effective gain: 8·5 dB

Peak vision transmitter power: 2x40 kW

Mean E.R.P.: 570 kW

— — — Stockholm E.R.P. limit

Unit field corresponds to an E.R.P. of 1 MW

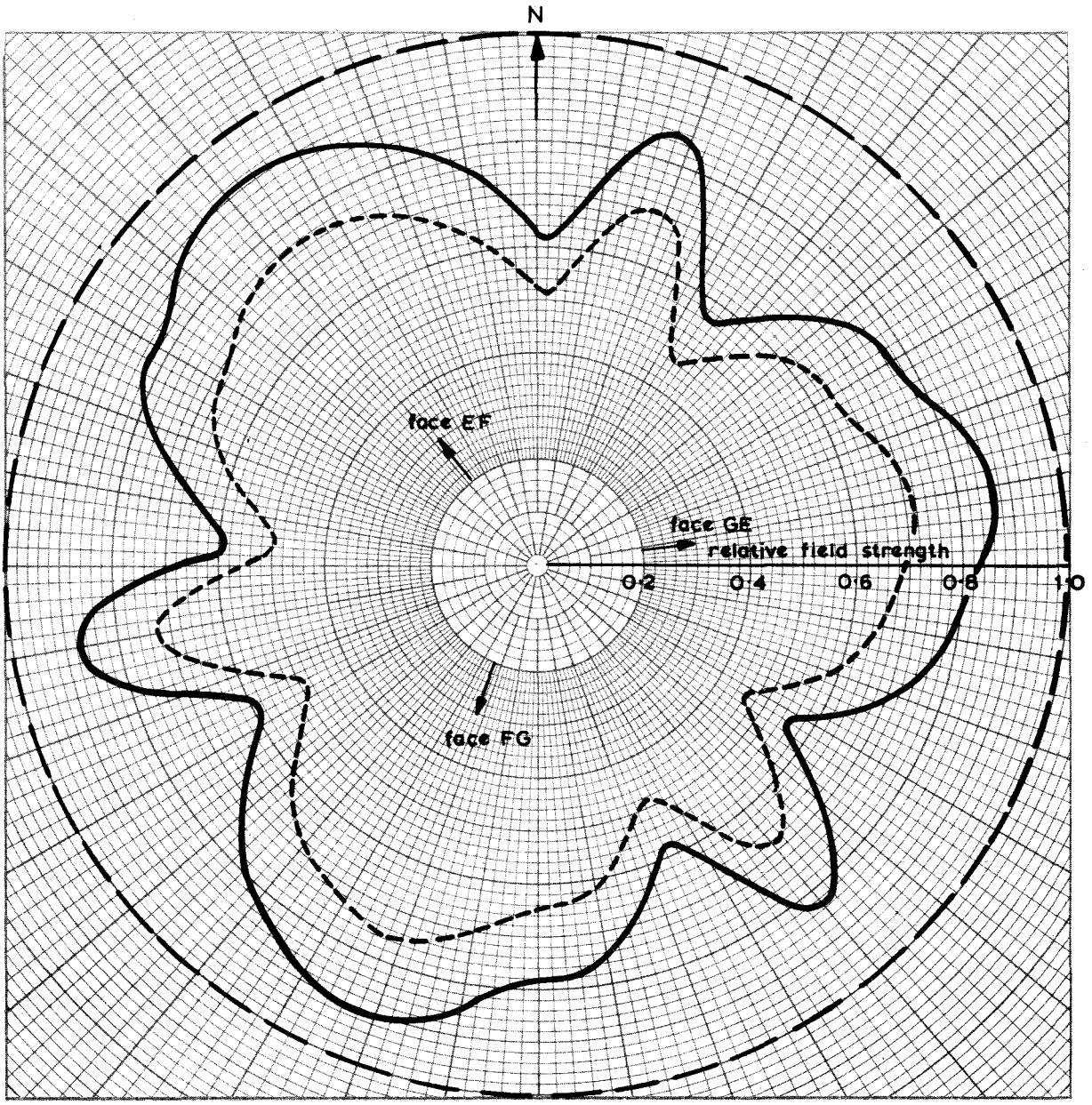

Fig. 9. Horizontal radiation pattern: Channel 33 (BBC 2)

HORIZONTAL POLARIZATION

Vision carrier 567·25 MHz, Sound carrier 573·25 MHz

- - - - - - Mean effective gain: 9·0 dB	——— Mean effective gain: 8·6 dB
Peak vision transmitter power: 2 x 25 kW	Peak vision transmitter power: 2x40 kW
Mean E.R.P.: 400 kW	Mean E.R.P.: 580 kW

— — — — Stockholm E.R.P. limit

Unit field corresponds to an E.R.P. of 1MW

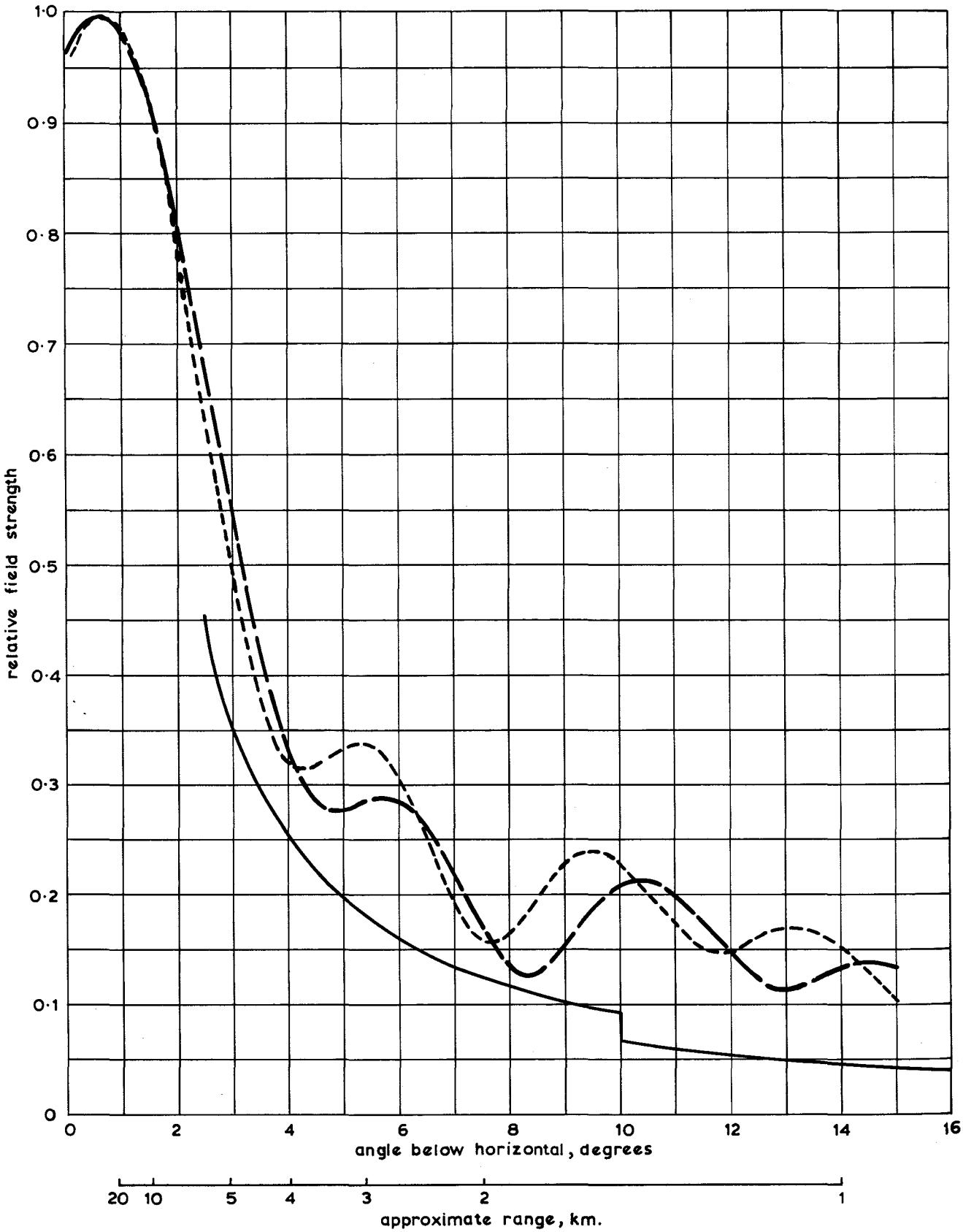

Fig. 10. Vertical radiation pattern on bearing 82° ETN (face GE)

— — — Channel 26 (BBC 1)

– – – – – Channel 33 (BBC 2)

——— Specified minimum field

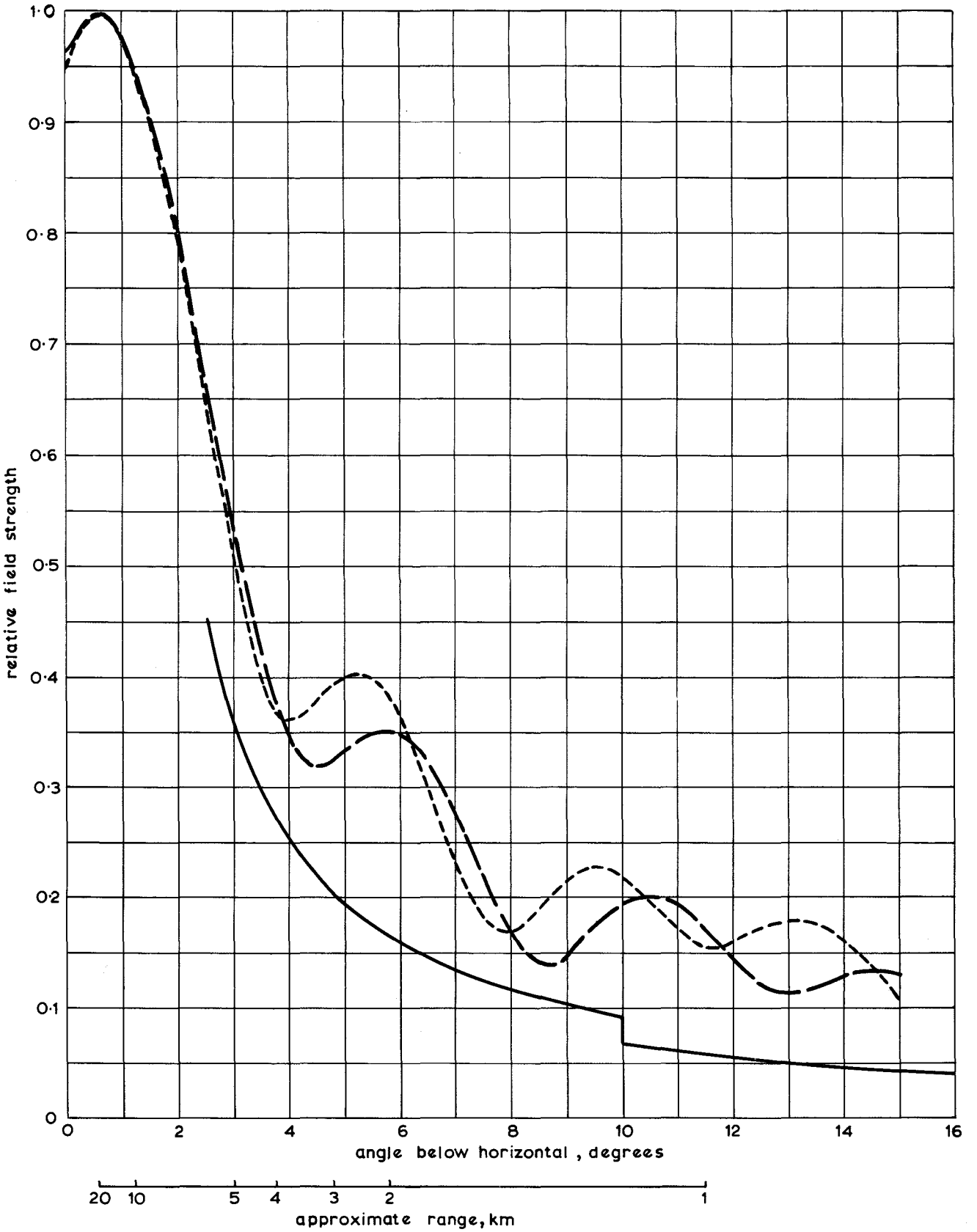

Fig. 11. Vertical radiation pattern on bearing 202° ETN (face FG)

——— Channel 26 (BBC 1)

- - - - - - - Channel 33 (BBC 2)

——————— Specified minimum field.

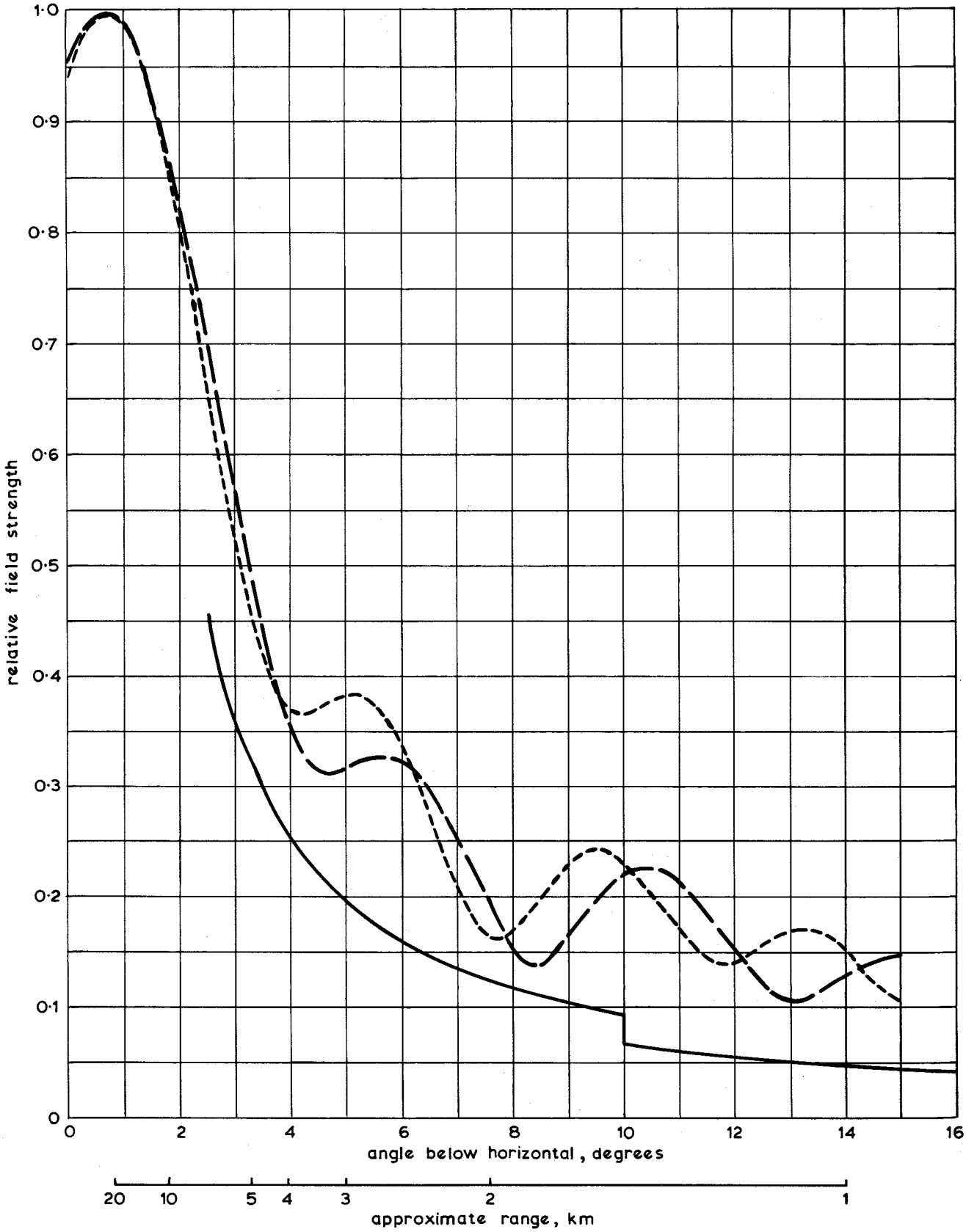

Fig. 12. Vertical radiation pattern on bearing 322° ETN (face EF)

— — — Channel 26 (BBC 1)

- - - - - - Channel 33 (BBC 2)

——— Specified minimum field

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AN INVESTIGATION OF HEAD CLOGGING ON TRANSVERSE-SCAN VIDEO TAPE RECORDERS

KEY TO TYPE CODING

VIDEO TAPE RECORDER:	TYPE A – RCA TR22 and TR4
	TYPE B – Ampex VR2000
	TYPE C – Ampex VR1000
HEADWHEEL:	TYPE D – RCA Low-band
	TYPE E – Ampex Mark 10
	TYPE F – Ampex Mark 3
TAPE:	TYPE G – Ampex 144
	TYPE H – Memorex 77V
	TYPE J – EMI 620
	TYPE K – 3M 379
	TYPE L – 3M 399
POLE-TIP MATERIAL:	TYPE M – Alfecon
	TYPE N – Alfesil

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